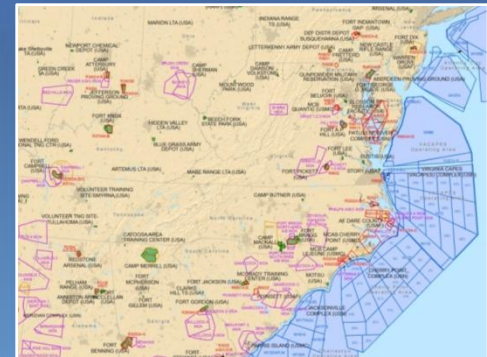
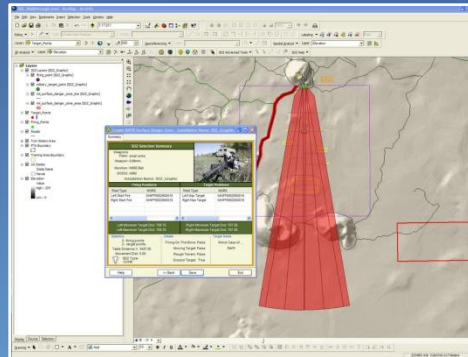
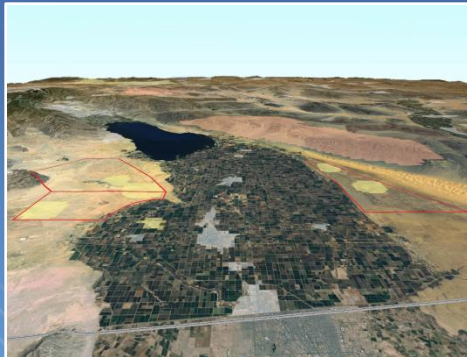


# RANGE SUSTAINABILITY

## GIS APPLICATIONS AND ENTERPRISE IMPLEMENTATIONS



May 4, 2009

Gabe Lovasz, Geospatial Analyst, ManTech SRS

Molly Rodriguez, Geospatial Analyst, ManTech SRS

-In Support of-

The Office of the Secretary of Defense

Report Documentation Page				Form Approved OMB No. 0704-0188	
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16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>18</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

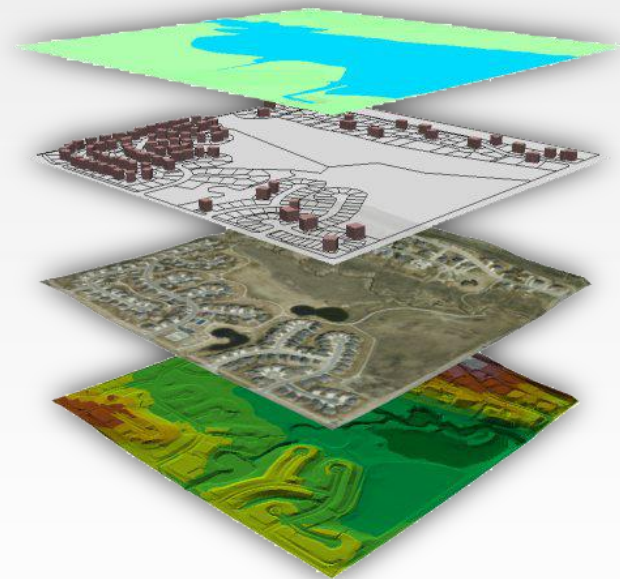
# AGENDA

- What is GIS?
- GIS tools for the Range Planner/Operator
- Encroachment Concerns
- Regional Partnerships
- Range Sustainment Efforts (GIS Components)

# WHAT IS GIS?

*“A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.”*

*Environmental Systems Research Institute  
(ESRI)*



# GIS TOOLS FOR THE RANGE PLANNER / OPERATOR

## Desktop Applications

- ESRI's ArcGIS Desktop Suite (Arview, ArcEditor, ArcInfo)
- ESRI's ArcGlobe
- "Spatial Analyst" and "3D Analyst" extensions
- Range Managers Toolkit (RMTK) ArcGIS extension

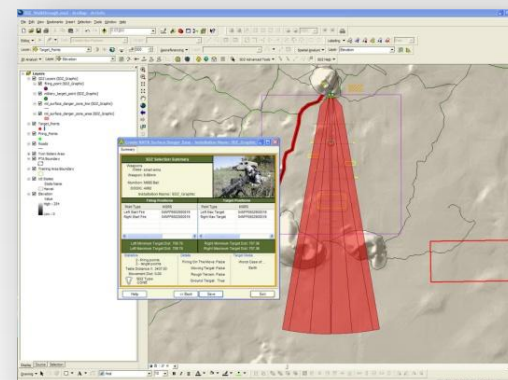
## Web-Based GIS

- ArcGIS Server (Army Range Mapper)
- Range Managers Toolkit (RMTK) extension
- Google Earth

# RANGE MANAGERS TOOLKIT (RMTK)

## Surface Danger Zone (SDZ) Tool

- “Wizard” driven
- Army and Marine Corps weapons inventory
- Supports creation of combined live fire exercise/combined arms exercise ranges

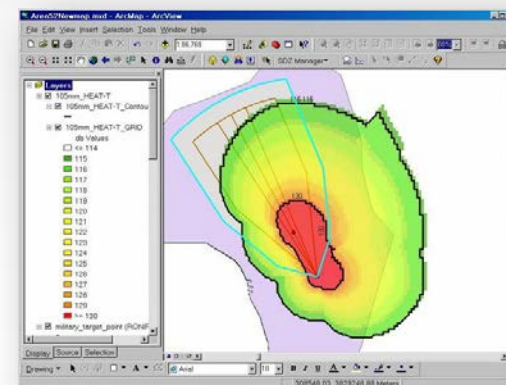


## Noise Tool

- Model noise contours based on weapon, munitions, location, and atmospheric condition
- Helps support situational awareness

## Weapons Danger Zone (WDZ) Tool

- Air to ground weapons platforms
- Supports rotary, fixed-wing, and unmanned aerial systems



# RANGE SUSTAINMENT CONSIDERATIONS

*“The Office of the Deputy Under Secretary of Defense (Installations and Environment) Sustainable Ranges Initiative is charged to develop a comprehensive response to **encroachment** in order to preserve DoD's capability to train and test on its land and sea ranges, operating areas, and airspace.”*

*-Sustainable Ranges Initiative*

## Encroachment Concerns

Threatened & Endangered Species/Critical Habitat	Cultural Resources
Airspace	Wetlands
Noise Restrictions	Water Quality/Supply
Adjacent Land Use	Range Transients



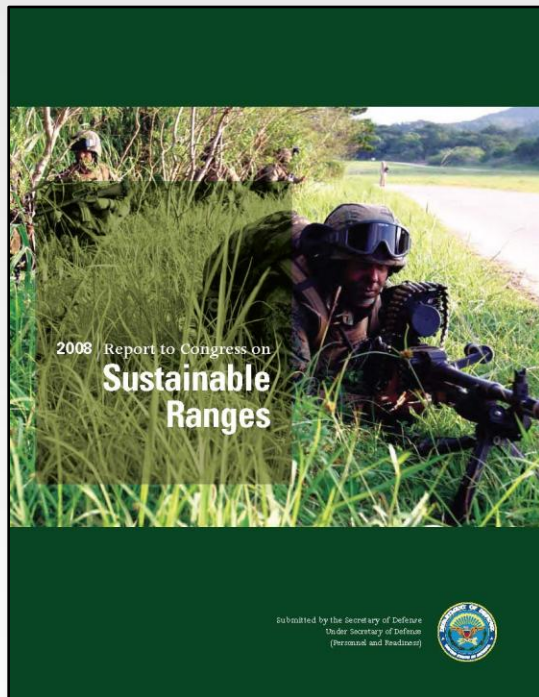
# REGIONAL PARTNERSHIP EFFORTS

- Encroachment
  - Most encroachment activities outside of DoD fence line.
  - Addressing encroachment difficult to manage and sometimes beyond DoD's reach.
- Value of Regional Partnerships
  - Share GIS and decision-support information.
  - Link efforts with other stakeholders and federal agencies.
  - Support community-driven planning and compatible land use.
  - Promote rural landscapes and working lands at regional scale.
  - Support of readiness mission.

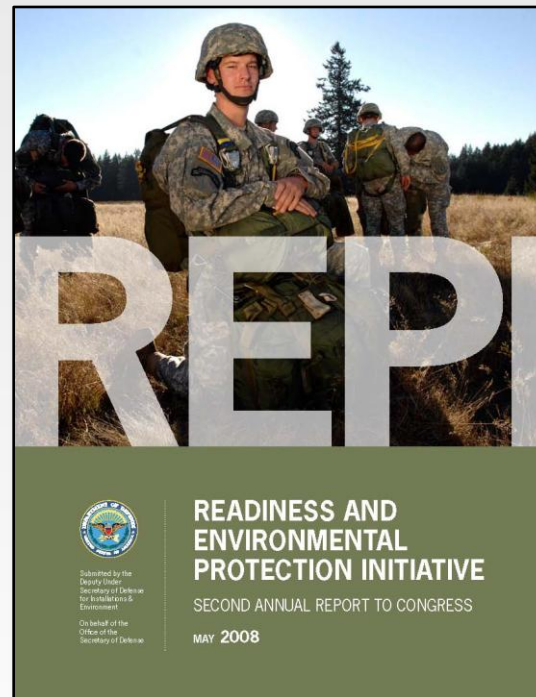




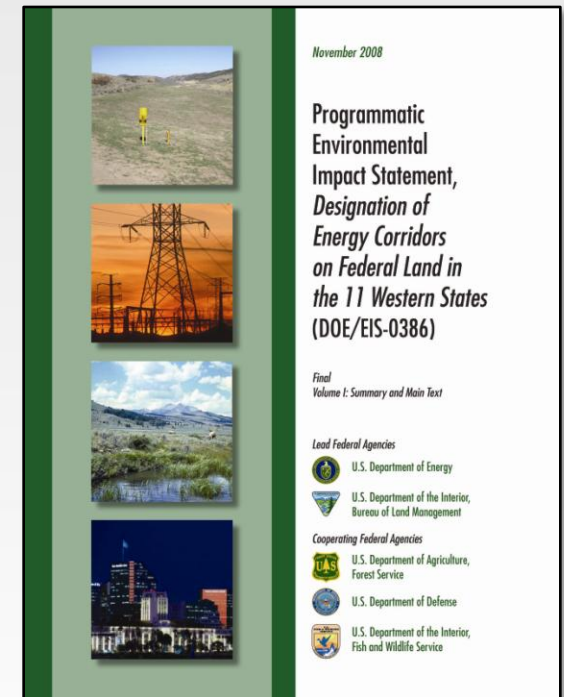
# RANGE SUSTAINMENT AND GIS



Report to Congress on Sustainable Ranges



Readiness and Environmental Protection Initiative (REPI)



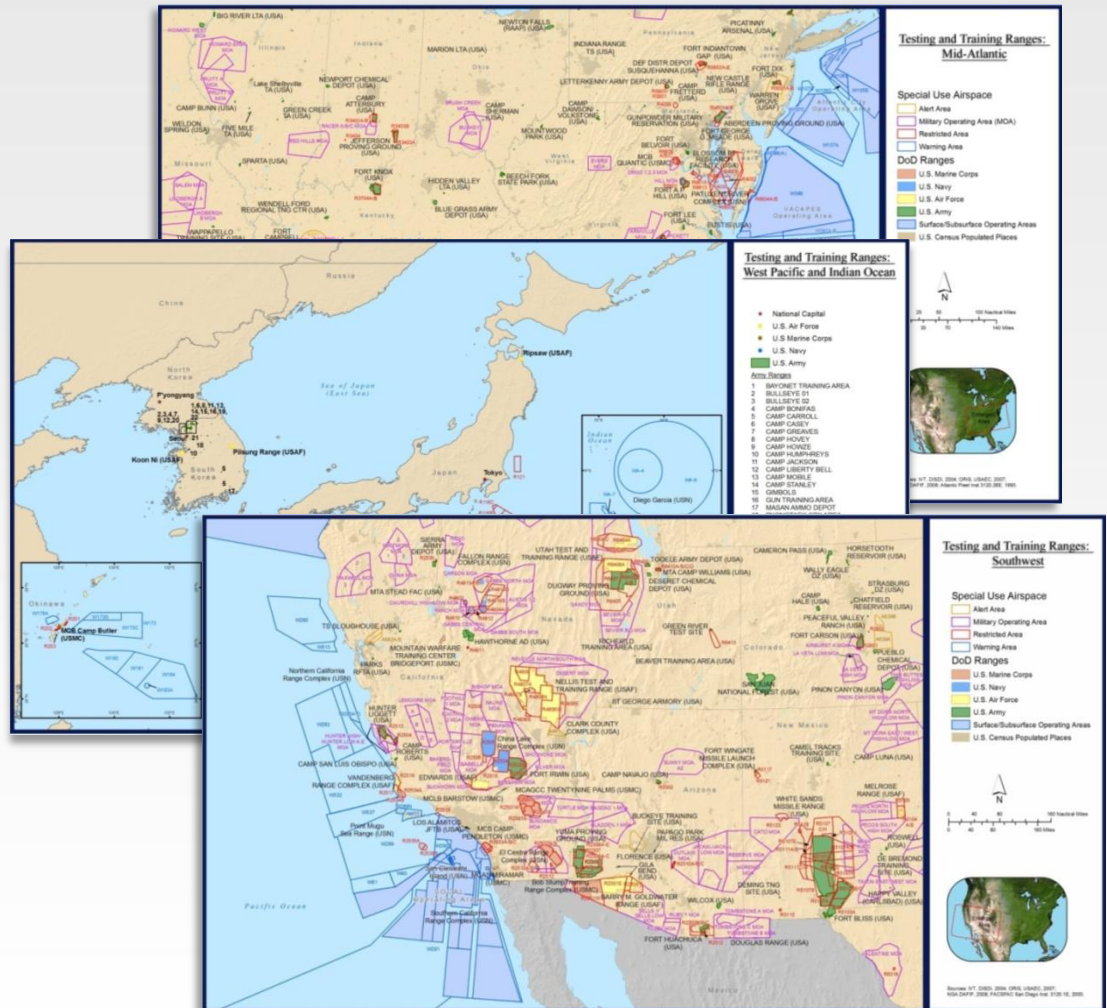
West-wide Energy Corridor PEIS

# REPORT TO CONGRESS ON SUSTAINABLE RANGES

- Report Addresses Two Congressional Reporting Requirements Under National Defense Authorization Act (NDAA):
  - Develop a comprehensive plan to address training constraints (FY2003 NDAA, Section 366)
  - Report on the impacts of encroachment (FY2004 NDAA, Section 320)
- GIS Component is the Report Inventory
  - Regional Range and Special Use Airspace (SUA) Maps
  - Tabular Range Inventory
  - SUA Inventory
  - Military Training Route (MTR) Inventory

# RANGE AND SPECIAL USE AIRSPACE REGIONAL MAPS

- Maps Include Land Ranges, Airspace, and Ocean Surface/Subsurface Operating Areas
- Land Range GIS data (footprints) from Services
- Airspace GIS data
  - National Geospatial Intelligence Agency (NGA)
  - Digital Aeronautical Flight Information File (DAFIF)

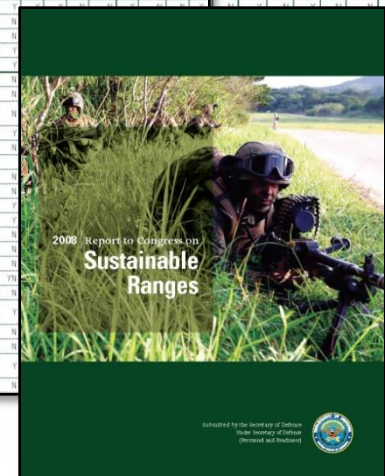




# RANGE INVENTORY

- Range Inventory is Compiled from Service Inventories and Geodatabases
- Organized by Service and Contains:
  - Name of range or range complex
  - State/country
  - Size information
  - Range type (air-to-air, air-to-ground)

Military Service	Range Complex	United States (US) or Overseas (OS)	State or Country	Command/Component	Range Description							Range Type									
					Land Area for Range (acres)	Special Use (sq mi)	Sea Surface Area (sq mi)	Underwater Training Area (sq mi)	Air to Air or Air to Surface	Air to Ground	Land Impact Area	Land Impact Range	CRWV	Quasi-Operating Area	MDIT	Underwater Training Range	Amphibious Area	Other			
	Fort Gordon	US	GA	TRADOC	49,149	0	0	0	0	N	N	Y	Y	N	N	N	N	Y			
	Camp Grafton	US	ND	TRADOC	11,380	0	0	0	0	N	N	Y	Y	N	N	N	N	Y			
	Camp Guernsey	US	WY	ARNG	35,062	46	0	0	0	N	N	Y	Y	N	N	N	N	Y			
	Hunter-Liggett	US	CA	USARV	153,872	113	0	0	0	N	N	Y	Y	N	N	N	N	Y			
	Korshenko MIL RES	US	HI	ARNG	434	0	0	0	0	N	N	Y	Y	N	N	N	N	Y			
Marine Corps	MCR Quantico	US	VA	MCCDC	64,000	278	0	0	Y	Y	Y	Y	N	N	N	N	N	Y			
	MCLB Albany	US	GA	MATCOM	4	0	0	0	N	N	N	Y	Y	N	N	N	N	Y			
	MCLB Barrow	US	CA	MATCOM	2,430	0	0	0	N	N	N	Y	Y	N	N	N	N	Y			
	MCMATC Bridgeport	US	CA	TECOM	10,000	0	0	0	N	N	Y	Y	N	N	N	N	N	Y			
	MCRD Parris Island	US	SC	TECOM	1,300	0	0	0	N	N	Y	Y	N	N	N	N	N	Y			
	Atlantic City	US	NJ	CHC	0	5,585	8,413	8,413	Y	N	N	Y	Y	N	N	N	N	Y			
Navy	Atlantic Test Range (Patuxent River)	US	MD	NAVAIR	5,700	3,401	330	0	Y	Y	Y	Y	N	N	N	N	N	Y			
	Atlantic Undersea Test and Evaluation Center (AUTEC)	OS	Bahamas	NAVSEA	0	870	1,320	195	Y	N	N	Y	Y	N	N	N	N	Y			
	Boston	US	MA	CHC	12,440	10,099	13,494	13,494	Y	Y	Y	Y	N	N	N	N	N	Y			
	Cherry Point	US	NC	CHC	0	18,710	18,710	18,710	Y	N	N	Y	Y	N	N	N	N	Y			
	China Lake	US	CA	NAVAIR	1,141,200	13,881	0	0	Y	Y	Y	Y	N	N	N	N	N	Y			
	Daegu Densu	OS	ROK	CHC	0	32,662	0	0	Y	N	N	Y	Y	N	N	N	N	Y			
	El Centro	US	CA	CHC	43,940	286	0	0	Y	Y	N	Y	Y	N	N	N	N	Y			
	Fallou	US	NV	CHC	232,481	14,182	0	0	Y	Y	Y	Y	N	N	N	N	N	Y			
	Guantanamo	OS	Cuba	CHC	0	13,175	13,118	13,118	Y	N	Y	Y	N	N	N	N	N	Y			
	Gulf of Mexico	US	FL MS TX	CHC	10,067	96,360	0	0	Y	Y	Y	Y	N	N	N	N	N	Y			
	Hawaii Islands	US	HI	CHC	303	50,540	214,010	214,010	Y	N	N	Y	Y	N	N	N	N	Y			
	Jacksonville	US	FL GA	CHC	17,229	37,443	150,090	150,090	Y	Y	Y	Y	N	N	N	N	N	Y			
	Japan	OS	Japan	CHC	0	11,615	0	0	Y	N	Y	Y	N	N	N	N	N	Y			
	Kay West	US	FL	CHC	1	24,812	8,262	8,262	Y	Y	Y	Y	N	N	N	N	N	Y			
	Mariana Islands	OS	CMR Micronesia	CHC	24,954	9,738	8,690	8,690	Y	N	Y	Y	N	N	N	N	N	Y			
	Naragansett	US	RI	CHC	0	13,005	27,208	27,208	Y	N	N	Y	Y	N	N	N	N	Y			
	Northern California (NORCAL)	US	CA	CHC	0	19,622	0	0	Y	Y	N	Y	Y	N	N	N	N	Y			
	Northwest Training Range Complex	US	CA OR WA	CHC	49,674	42,714	128,353	128,353	Y	Y	Y	Y	N	N	N	N	N	Y			
	Okinawa	OS	Japan	CHC	0	25,050	0	0	Y	Y	Y	Y	N	N	N	N	N	Y			

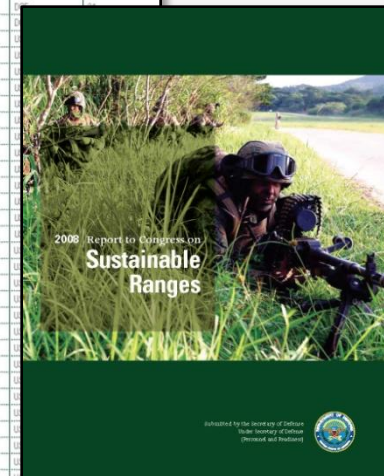


# AIRSPACE INVENTORIES

- Special Use Airspace (SUA) and Military Training Route (MTR) Inventories
- Information comes directly from National Geospatial Intelligence Agency's (NGA) Digital Aeronautical Flight Information File (DAFIF)
- Service inventories list the airspace names

Military Training Route	Originating Agency*	Scheduling Agency*	Effective Times	Length (NMI)
IR046	347 Rescue Wing, Detachment 1/RO, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing, Detachment 1/ROA, 8707 North Golf Course St., MacDill AFB, FL 3	0700-2400 local, daily	171
IR047	347 Rescue Wing, Detachment 1/RO, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing, Detachment 1/ROA, 8707 North Golf Course St., MacDill AFB, FL 3	0700-2400 local, daily	67
IR048	347 Rescue Wing, Detachment 1/RO, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing		
IR049	347 Rescue Wing, Detachment 1/RO, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing		
IR050	347 Rescue Wing, Detachment 1/RO, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing		
IR051	347 Rescue Wing, Detachment 1/RO, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing		
IR053	347 Rescue Wing, Detachment 1/RO, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing		
IR055	347 WG, Detachment 1/RO, 8707 North Golf Course St., MacDill AFB, FL 33621-5205	347 WG, Detachment 1/ROA, 8707 North Golf Course St., MacDill AFB, FL 3		
IR056	347 WG, Detachment 1/RO, 8707 North Golf Course St., MacDill AFB, FL 33621-5205	347 WG, Detachment 1/ROA, 8707 North Golf Course St., MacDill AFB, FL 3		
IR057	16 OSS/DOAA, Harburt Field, FL 32544 DSN 579-7409, C850-884-7409	16 OSS/DOAA, Harburt Field, FL 32544 DSN 579-7409, C850-884-7409		
IR059	16 OSS/DOAA, Harburt Field, FL 32544 DSN 579-7409, C850-884-7409	16 OSS/DOAA, Harburt Field, FL 32544 DSN 579-7409, C850-884-7409		
IR062	CDMSTRKRIGHT WINGLANT, Oceana NAS, Virginia Beach, VA 23460 DSN 433-4013, C757-43	FACSFAC VACAP		
IR065	14 OSS/OSOP, Columbus AFB, MS 39710 DSN 742-7560/7633, C862-434-7560/7633	50 FTS, Columbus		
IR067	14 OSS/OSOP, Columbus AFB, MS 39710 DSN 742-7560/7633, C862-434-7560/7633	48 FTS, Columbus		
IR068	14 OSS/OSOP, Columbus AFB, MS 39710 DSN 742-7560/7633, C862-434-7560/7633	48 FTS, Columbus		
IR070	14 OSS/OSOP, Columbus AFB, MS 39710-5000 DSN 742-7560/7633, C862-434-7560/7633	48 FTS, Columbus		
IR077	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Original		
IR078	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Original		
IR079	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Original		
IR080	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Original		
IR081	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Original		
IR082	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Original		
IR083	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Original		

2007 SUA Name	Controlling Agency	Range Complex/Installation Name	Upper Altitude	Lower Altitude	Military Service*	Area (nm <sup>2</sup> )
74308N	FAA, LOS ANGELES ARTCC	Nellis AFB	UNLTD	SURFACE	DOE	1,280
74308S	FAA, LOS ANGELES ARTCC	Nellis AFB	UNLTD	SURFACE	DOE	1,280
74309	FAA, LOS ANGELES ARTCC	Nellis AFB	UNLTD	SURFACE	DOE	1,280
74301A	FAA, WASHINGTON, DC ARTCC	Aberdeen Proving Ground	UNLTD	SURFACE	US	1,280
74301B	FAA, WASHINGTON, DC ARTCC	Aberdeen Proving Ground	010000AMSL	SURFACE	US	1,280
72101	FAA, ATLANTA ARTCC	Aviation Army Depot	000000AMSL	SURFACE	US	1,280
72102	FAA, ATLANTA ARTCC	Aviation Army Depot	FL229	SURFACE	US	1,280
74301A	FAA, CAPE APP	Camp Edwards	000000AMSL	SURFACE	US	1,280
74301B	FAA, MINNEAPOLIS ARTCC	Camp Greining	FL239	SURFACE	US	1,280
74301C	FAA, MINNEAPOLIS ARTCC	Camp Greining	000000AMSL	SURFACE	US	1,280
77001A	FAA, DENVER ARTCC	Camp Greining	000000AMSL	SURFACE	US	1,280
77001B	FAA, DENVER ARTCC	Camp Greining	025500AMSL	08000AMSL	US	1,280
77001C	FAA, DENVER ARTCC	Camp Greining	FL300	21500AMSL	US	1,280
74301A	FAA, ATLANTA ARTCC	Camp Murrell	000700AGL	SURFACE	US	1,280
74301B	FAA, MINNEAPOLIS ARTCC	Camp Riley	FL270	SURFACE	US	1,280
72504	FAA, OAKLAND ARTCC	Camp Roberts	015000AMSL	SURFACE	US	1,280
72401A	FAA, MEMPHIS ARTCC	Charfee	FL300	SURFACE	US	1,280
72401B	FAA, MEMPHIS ARTCC	Charfee	FL300	SURFACE	US	1,280
72402	FAA, MEMPHIS ARTCC	Charfee	FL300	SURFACE	US	1,280
74102A	FAA, BOSTON ARTCC	Devens Reserve Forces Training Area	001995AMSL	SURFACE	US	1,280
74102B	FAA, BOSTON ARTCC	Devens Reserve Forces Training Area	001995AMSL	02000AMSL	US	1,280
72390A	FAA, ALBUQUERQUE ARTCC	Florence Training Site	010000AMSL	SURFACE	US	1,280
72390B	FAA, ALBUQUERQUE ARTCC	Florence Training Site	010000AMSL	10000AMSL	US	1,280
72390C	FAA, ALBUQUERQUE ARTCC	Florence Training Site	FL350	17000AMSL	US	1,280
74101A	FAA, POTOMAC APP	Fort A.P. Hill	003000AMSL	SURFACE	US	1,280
74101B	FAA, RICHMOND TWR	Fort A.P. Hill	005000AMSL	SURFACE	US	1,280
73002A	FAA, COLUMBUS TWR	Fort Benning	008000AMSL	00500AGL	US	1,280
73002B	FAA, ATCT, COLUMBUS	Fort Benning	004000AMSL	SURFACE	US	1,280
73002C	FAA, ATCT, COLUMBUS	Fort Benning	008000AMSL	04000AMSL	US	1,280
73002D	FAA, ATCT, COLUMBUS	Fort Benning	014000AMSL	08000AMSL	US	1,280
73002E	FAA, ATCT, COLUMBUS	Fort Benning	008000AMSL	SURFACE	US	1,280



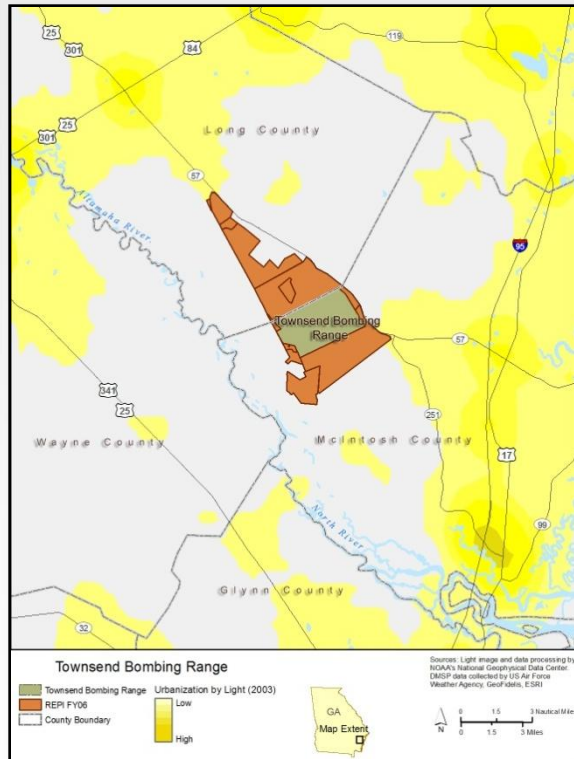
# READINESS ENVIRONMENTAL PROTECTION INITIATIVE (REPI)

- Supports Compatible Land Use and Conservation Initiatives at Ranges and Installations
- Section 2864(a) FY2004 NDAA
  - Allows the Services to enter into agreements with private conservation organizations or with state and local governments
  - Allows the Services to cost-share acquisition of restrictive/conservation easements from willing sellers
- Serves Several Purposes
  - Protect land for conservation purposes
  - Limit incompatible development around ranges and installations

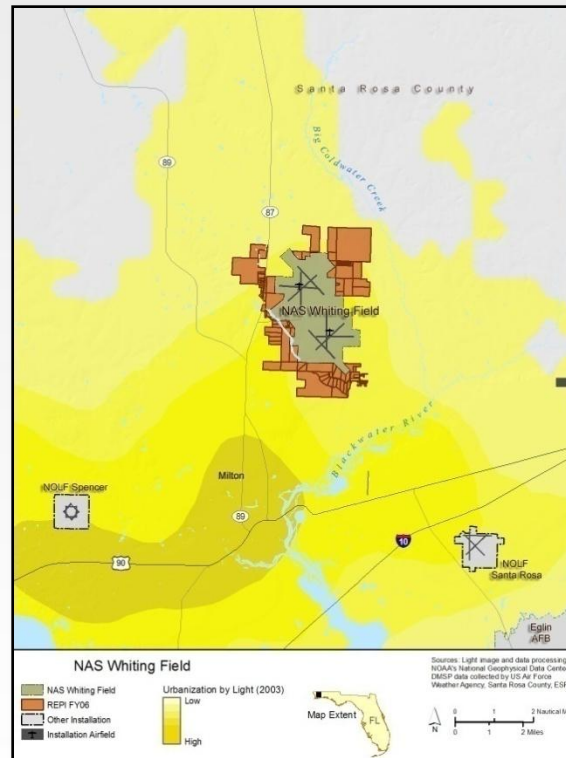


# USE OF GIS IN THE REPI REPORT

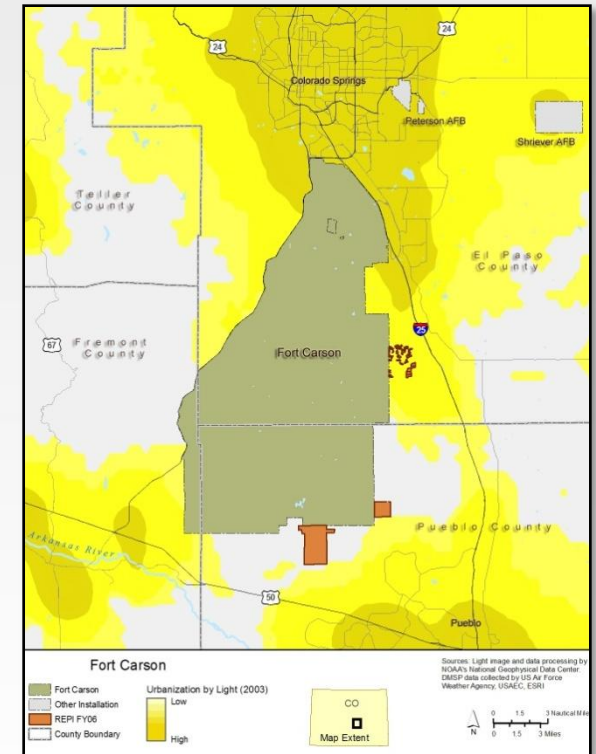
- GIS Component
  - Maps of the installation/range and the parcels acquired with REPI funds



Townsend Bombing Range USMC



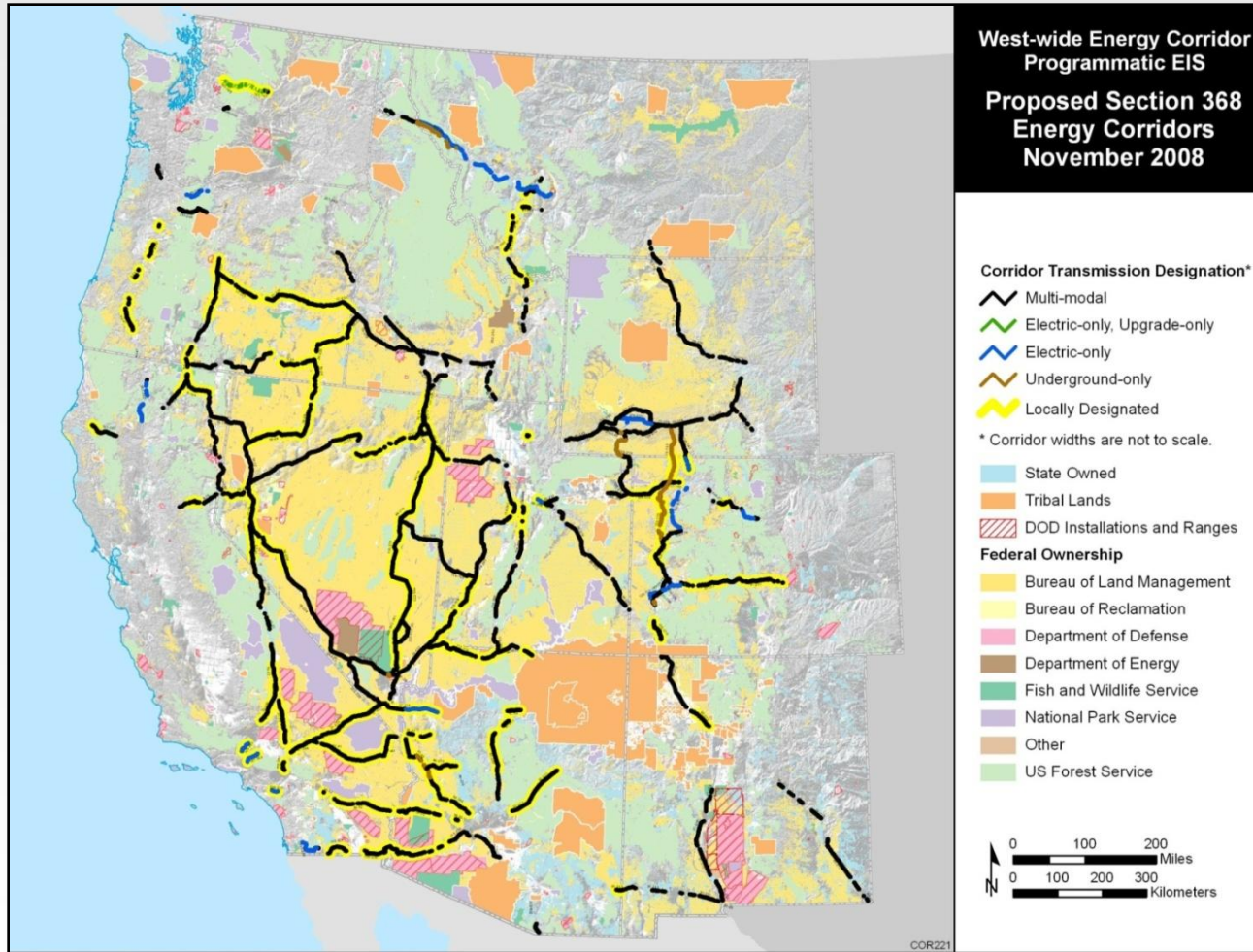
NAS Whiting Field (USN)



Fort Carson (USA)



# WEST-WIDE ENERGY CORRIDOR PEIS



Energy Act 2005  
Section 368:

- Designation of energy corridors on federal land in 11 Western states
- Oil, gas, hydrogen pipelines & electrical transmission lines

# WEST-WIDE ENERGY CORRIDOR PEIS

- GIS was an Integral Part of Energy Corridor Designation Process
  - Used to plan location of proposed corridors
- Range Sustainment Perspective
  - Corridor locations relative to ranges and installations
  - Cross low-level (1,000ft) Special Use Airspace (SUA) and Military Training Routes (MTRs)
- Provided GIS Data to Dept. of Energy
  - DoD ranges and installation boundaries
  - Low-level Special Use Airspace and Military Training Routes

# ENERGY CORRIDOR GIS ANALYSIS

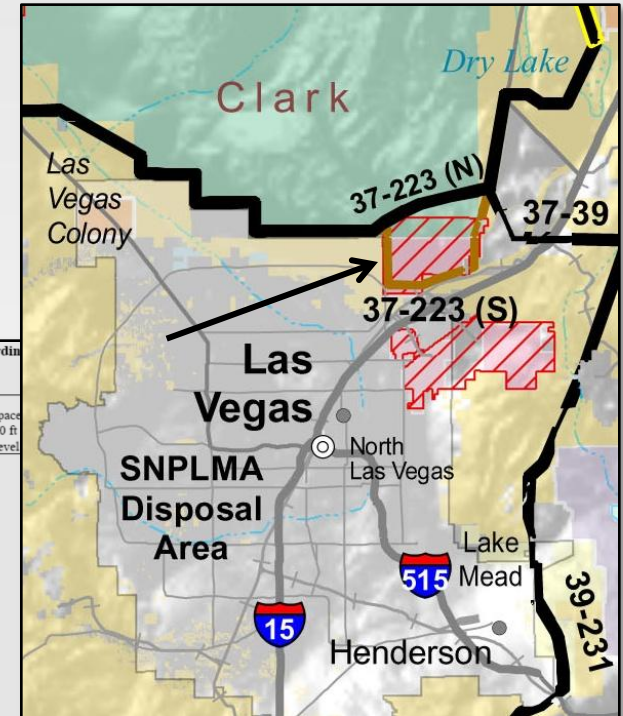
- Identified Intersections
  - Energy corridor and range/installation boundaries, and low-level airspace
  - Is training impacted?

- Land Intersections
  - Worked with Services

- Airspace Intersections
  - DoD comments in
  - GIS attribute table
  - Appendix L of Final EIS

TABLE L-1 Proposed Energy Corridors That Would Require DOD Coordination  
Project Planning<sup>a</sup>

State	Corridor	Military Training Route with Floor <1,000 ft above Ground Level	Special Use Airspace with Floor <1000 ft above Ground Level
Arizona	30-52	X	
	41-46	X	
	46-269	X	
	46-270	X	
	61-207	X	
	62-211	X	
	68-116	X	
	113-116	X	
	115-208	X	
	115-238	X	
	116-206	X	
	234-235	X	
California	3-8	X	
	6-15	X	
	8-104	X	
	15-104	X	
	16-104	X	
	18-23	X	X
	23-25	X	X
	23-106	X	X
	27-41	X	X
	27-225	X	X
	27-266		X
	30-52	X	X
Colorado	101-263	X	
	108-267	X	
	115-238	X	
	261-262	X	
	264-265	X	
Idaho	87-277	X	
	29-36		X
	36-228		X
Nevada	49-112	X	
	15-17	X	
	15-104	X	



Nellis Small Arms Range

# MORE INFORMATION

Environmental Systems Research Institute (ESRI)

<http://www.esri.com/>

Western Regional Partnership (WRP)

<http://www.wrpinfo.org>

Southeast Regional Partnership for Planning and Sustainability

<http://www.serppas.org/>

2008 Readiness Environmental Protection Initiative (REPI) Report and 2008 Report to Congress on Sustainable Ranges

<https://www.denix.osd.mil/portal/page/portal/denix/range/Home>

West-Wide Energy Corridor PEIS

<http://corridoreis.anl.gov/>

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